

REMARKS

Applicants have now had an opportunity to carefully consider the Examiner's comments set forth in the Office Action of September 9, 2005. The indication of allowable subject matter is gratefully acknowledged.

For purposes of a brief review, the subject invention is directed to a color halftoning system and method using successive-filling of a single stochastic screen for a plurality of color separation to achieve improved halftone smoothness and reduce granularity in the highlight region in comparison to prior art independent per-separation screens. More particularly, the particular successive-filling technique simultaneously factors multi-level aspects and successive filling aspects into the processing algorithm to better compute the number of ink drops and their location for document generation. In other words, the subject development is additionally concerned with how much ink to put at a selected spot to be marked; as opposed to the prior art which merely deals with whether to put any ink there or not. The set of levels of a particular screen that would be used are decided from among the possible multiple levels for separation based on the input level for the separation and input levels for prior processed separations. The selection is done so as to best disperse the dots and minimize overlap. More particularly, the printing of more than one ink drop per pixel location comprises filling a remaining level of the color separation being processed at pixel locations with successive threshold values already having a base level of a previously processed color separation. In addition, the printing of multiple ink drops is at the lowest available threshold values of the screen and the highest luminance in a non black rendered area of the screen, and the printing of a single ink drop is at other available threshold values of the screen in the non black rendered area adjacent to the multiple ink drop printing.

The Cited Reference

The Examiner's citation to Harrington '748 has been considered, but it is respectfully submitted that the reference fails to teach a successive-filling technique in accordance with the subject amended claims. More particularly, with reference to column 3 of the '748 patent, the reference teaches that "If it is necessary to overlap ON pixels, the overlapping portion starts with the magenta separation. After the cyan separation is halftoned, the yellow separation is halftoned. However, in this case, the fill order is reversed. Initially,

any OFF pixels remaining are set to ON. Next however, if it is necessary to overlap ON pixels, the overlapping starts with pixels turned in only the cyan separation. Magenta pixels are only overlapped after all the cyan pixels are overlapped." (lines 17-25) "The invention reduces [luminance] contrasts by placing the yellow ink in the reverse order from the other inks, i.e., the last pixel of the halftone cell ordering used to fill black, magenta, and/or cyan, will be the first pixel of the cell to be colored by the yellow." (lines 39-44)

The subject reference merely concerns binary halftoning – either you put a spot down or you do not. There is no suggestion or teaching in '748 of employing Steve's algorithm to a multi-level halftoning process, i.e., the additional determination of when and where to put down multiple drops at a particular pixel location.

The claims distinguish over the cited reference

The amended claims distinguish over the cited reference by including the limitations to filling output levels of the screen "with a plurality of output levels" (claims 1 and 12), or "multiple ink drops" (claim 14), so that the darker output levels occupy lowest available threshold values of the screen and a highest luminance in the non black area, and the lighter output levels occupy other threshold values of the screen in the non black area adjacent to the darker output level. In other words, there is no mere successive filling of available or "OFF" pixels, but rather an additional limitation of disposing multi-level halftoning ink levels at selected screen locations to achieve the desired goals of better coverage, dispersions and spatial frequency optimization for enhanced smoothness in highlight color regions.

CONCLUSION

For the reasons detailed above, it is submitted all claims remaining in the application (Claims 1-3, 5-12 and 14) are now in condition for allowance. The foregoing comments do not require unnecessary additional search or examination.

In the event the Examiner considers personal contact advantageous to the disposition of this case, he/she is hereby authorized to call Patrick R. Roche, at telephone number (216) 861-5582.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & MCKEE, LLP

2/2/06

Date

Patrick R. Roche
Patrick R. Roche, Reg. No. 29,580
1100 Superior Avenue, Seventh Floor
Cleveland, Ohio 44114-2579
(216) 861-5582